

SPATIAL VARIATIONS AND CLUSTERING IN THE RATES OF YOUTH UNEMPLOYMENT AND NEET:

A COMPARATIVE ANALYSIS OF ITALY, SPAIN AND THE UK

April 16, 2020

Steve Bradley*, Giuseppe Migali[^] and Maria Navarro Paniagua*

ABSTRACT: We investigate the ‘determinants’ of spatial variations in youth unemployment and NEET rates, and the presence of spatial clusters, for Italy, Spain and the UK. Using Labour Force Survey data for the period 1993-2018 at a ‘regional’ level we obtain broadly consistent measures of quarterly youth unemployment and NEET rates. Our findings suggest that youths are sensitive to aggregate labour market conditions. We find a discouraged worker effect, again larger for older youths than for teenagers. In the UK and Spain, temporary jobs are more likely to be preferred to part-time jobs, perhaps as a way of avoiding unemployment, whereas in Italy the opposite occurs. There is evidence of spatial clustering of youth unemployment and NEET rates. Our paper concludes with a discussion of the implications for place-based regional and labour market policies.

Key words: Youth unemployment, NEET, Regions, Clusters.

JEL: R11, R23, J40, J60

*Department of Economics, Lancaster University Management School, Lancaster University, Lancaster, UK, LA1 4YX.

[^]Department of Economics, Lancaster University Management School, Lancaster University and Magna Græcia University, Italy. Corresponding author.

1. INTRODUCTION

The youth unemployment experience of OECD countries over time has been very varied. In a review of OECD country performance, Scarpetta, Sonnet and Manfredi (2010) show that over the period 1995-97 to 2005-07 Italy and Spain had experienced higher than average youth unemployment rates, but they had also witnessed the greatest decline over the decade. In contrast, Britain had lower than average youth unemployment rates but had experienced higher than average increases. Iammarino, Rodriguez-Pose and Storper (2018) review more recent performance of regions across Europe in terms of economic growth rates and development. Italy, Spain and the UK stand out in terms of their differences in these respects. These differences in performance motivate our selection of countries, a point which we expand upon below in Section 3. Typically, however, the level and amplitude of the youth unemployment rate exceeds that for adults. In 2008, the youth-adult unemployment ratio was 2.8 for the OECD area, but ranged from 1.5 in Germany to between 3 and 4 in Denmark, Italy, Korea and United Kingdom, and above 4 only in Sweden and Spain (Scarpetta et al, 2010). Spain had by far the largest youth-adult unemployment ratio. A number of researchers have also documented the fact that young people are disproportionately affected by recessions, and the ‘Great Recession’ in 2007- 08 was no exception; the effects in Italy were particularly severe.

High rates of youth unemployment are a major policy concern because of the potentially long-term damaging effects, or ‘scarring effects’, such as a higher likelihood of repeat unemployment, lower future earnings and possible detachment from the labour market. Gregg (2001) shows for the UK that an additional 3 months unemployment before the age of 23 leads to an extra 2 months of unemployment or inactivity between the ages of 28 and 33. De Fraja, Lemos and Rockey (2017) also show that unemployment shocks occurring during the ages of 18-20 causes a permanent income loss of 2% with some differences for men and women, and much greater scarring effects for the less able. Gregg and Tominey (2005) also found for the UK that one year of unemployment at the age of 22 led to a wage penalty of 13-21% twenty years later. Policy makers have also recently become interested in the numbers of young people who are neither employed, in education or in training – the so-called NEET group, who are disengaged from both the labour market and the education and training system.¹ This group

¹ The term NEET emerged in the UK in the 1990s following the introduction of changes to unemployment benefit regulations for young people in 1988, the outcome of which was the removal of 16-18 year olds from the

comprises the unemployed but also the economically (and educationally) inactive, although an agreed definition has proved elusive (Maguire, 2015). Since this group do not engage in any form of meaningful human capital accumulation, it is likely that the scarring effects referred to above will be at least as great, and possibly greater, for the NEET group. However, although the literature on youth unemployment is substantial, that on the NEET group is relatively small. Very few studies investigate spatial variations in youth unemployment within countries and there are almost no studies which analyse the effect of spatial clustering on youth unemployment and NEET rates. Indeed, Maguire (2015) argues that the formulation of appropriate policy for the NEET group in particular is hampered by a lack of information on how many young people are in this group and where they are located. One could also add to this the need to understand how the size of this group varies over time.

This paper addresses two key issues and makes several contributions to the literature. First, we investigate the ‘determinants’ of variations in youth unemployment and NEET rates between regions (NUTS2 level) within countries and over time in order to gain a better understanding of potential causal mechanisms.² Variations in unemployment rates between regions within countries are much greater than disparities between countries or variations over time within countries. The second issue addressed is whether there is evidence of spatial autocorrelation in youth unemployment and NEET rates. This is possible given that the unemployed and economically inactive tend to be concentrated in particular regions and sub-regions.³ Our paper also contributes to the literature by comparing the experience of several countries, which enables us to uncover ‘common factors’ at work in determining regional disparities in youth unemployment and NEET rates in different countries. Finally, youth labour markets are dynamic, insofar as young people tend to move in and out of unemployment (and probably NEET) more frequently than their adult counterparts. Our data allow us to examine within year variation in youth unemployment and NEET rates so capturing in part this aspect of youth labour markets.⁴

To achieve these objectives, we use individual ‘worker’ level LFS data, collected quarterly, for each country for the time-period 1993-2018, which we aggregate to the regional level for Italy, Spain and the UK. By using LFS data, we are able to account for a richer set of

unemployment statistics (Maguire, 2015). The term is now used across the EU.

² The choice of NUTS2 level is determined by the publicly available LFS data in each country. We acknowledge that spatial disparities between sub-regions (NUTS3 level) are likely to be much greater, and as such our analysis is a first step in the understanding of the spatial determinants of youth unemployment and NEET rates.

³ An early study of spatial autocorrelation in unemployment rates in the UK context is Molho (1988).

⁴ We focus upon spatial variations in youth unemployment and NEET rates because this area is relatively under-researched when compared with the large micro econometric literature on youth unemployment. Future work will investigate the spatial and micro aspects of the LFS data.

covariates.

Our econometric results suggest that there are a number of common factors which increase youth unemployment and NEET rates, especially in the cases of Spain and the UK. For instance, the all age regional youth unemployment rates tend to rise when adult unemployment increases, as does the teenage unemployment rate except for Italy. A more muted effect is apparent with respect to the NEET group, which is expected, given that this group contains a higher proportion of discouraged workers. There is also some evidence that a larger percentage of immigrants in a region increases youth unemployment rates in the UK and Spain, especially for teenagers. A further common finding is that industry mix, the percentage of highly skilled youths and the percentage of SMEs in a region serve to reduce youth unemployment rates, reflecting demand and supply-side effects. Our evidence is mixed with respect to the size of the regional youth population. There is also evidence that there is a positive spill over effect between regional youth unemployment rates in all three countries, although the magnitude of these effects are smaller in the case of Italy. The difference in findings for these countries implies something about the level of interdependence between regions with respect to industry linkages and trade.

Our paper is structured as follows. In the following section, we discuss the previous literature and provide a brief overview of theoretical approaches to explaining regional disparities in economic growth rates and unemployment rates. This is followed in Section 3 by a description of our data and a justification for the selection of Italy, Spain and the UK. We present summary statistics on the persistence of spatial variations in youth unemployment and NEET rates, the spatial pattern of youth unemployment and NEET and the relationship between youth unemployment and NEET rates for the three countries. Section 4 describes our econometric model, that is, a spatial autocorrelation model of youth unemployment and NEET rates. This is followed in Section 5 by a discussion of our results and we end with our conclusions and policy implications.

2. A REVIEW OF THE LITERATURE AND THEORY

Traditional theoretical models of spatial disparities in the unemployment rate distinguish between equilibrium and disequilibrium causes. Equilibrium causes include demographic factors, such as the proportion of youths or females in the labour force, as well as other factors like industry mix and the stock of human capital (Lopez-Bazo and Artis, 2005). Equilibrium approaches suggest that regions have different underlying mean unemployment rates, and

‘asymmetric shocks’ simply move regions temporarily away from these mean values but eventually regions converge back, and regional unemployment relativities are restored (Blanchard and Katz, 1992). Supply-side explanations, such as the role of unions, benefit systems and worker preferences for local amenities and climate (Marston, 1986), are suggested to explain why regions do not return to some equilibrium level. In contrast, the disequilibrium approach suggests that regional disparities in unemployment persist because labour market adjustment mechanisms are weak. In the EU context, low geographical mobility and real wage rigidities are often blamed for this and mean that unemployment disparities are ‘history dependent’ (Martin, 1996). Fujita and Krugman (2004) discuss the more recent contribution from the so-called ‘new economic geography’, where the emphasis is upon the role of agglomeration economies and increasing returns to scale in driving spatial disparities in economic growth rates and hence unemployment rate. Increasing inward migration of skilled labour, together with higher rates of innovation lead to divergent economic growth between ‘prosperous’ regions and cities and their ‘less prosperous’ counterparts (Iammarino, Rodrigues-Pose and Storper, 2018). Iammarino et al (2018) also suggest that current disparities in economic growth rates and unemployment rates arise because of the long-cycle of development with particular emphasis on waves of technological progress originating in the 1970s, and what they call the ‘long-cycle of regional evolutionary features’ (p14). The latter refers to a localities endowments of skilled labour, firms, institutions, the ability to innovate and responses to change.⁵ These theoretical approaches are used to determine the variables used in our econometric analysis, and as such provide a framework for interpreting our findings.

In terms of the countries under investigation here, Ammermuller, Lucifora, Origo and Zwick (2010) show for Italy (and Germany) that the long-run ‘equilibrium’ relationship between the level of wages and the level of regional unemployment differs among regions and groups of workers within countries, particularly with respect to gender, skill level, and the position of workers in the wage distribution. For instance, they argue that labour market attachment varies spatially within Italy, and females in the south are less attached than males, possibly due to the lack of job opportunities. Similarly, workers at the lower end of the wage distribution, such as youths, are more likely to leave the labour market and become inactive rather than accepting lower wages should unemployment increase in the region. There have been a number of studies of regional unemployment for Spain, primarily because it has experienced some of the highest unemployment rates amongst OECD countries. For example, Lopez-Bazo and Artis (2005) find that equilibrium factors drive regional unemployment rates

⁵ Charron, Dijkstra and Lapuente (2012) analyse the quality of governance, which relates to the role of institutions, at a national and sub-national level, and show how this is correlated with the performance of regions.

in Spain, placing particular emphasis on the unequal distribution of amenities. The regional distribution of the youth population is another key factor. Silva and Vazquez-Grenno (2013) also highlight the important role of fixed term jobs in determining flows into unemployment. Similarly, Green and Livanos (2013) analyse the increase in involuntary non-standard (i.e. part time and/or temporary) employment pre- and post-Great Recession for UK regions, with the largest increases observed for the peripheral regions of the North and Northern Ireland. Young people and females are more likely to take this type of job and are therefore more likely to have a higher risk of unemployment and NEET.

There have been very few studies of spatial variations in youth unemployment and NEET rates. Nevertheless, several determinants of youth unemployment and NEET rates can be identified in the literature. First, the youth unemployment rate is more pro-cyclical than the adult unemployment rate and youths suffer more during recessions. Using regional level data for the EU, Moller (2017) shows that a 1 percentage point rise in the adult unemployment rate leads to a 2 percentage point increase in the youth unemployment rate. He investigates the impact of ‘youth structural factors’ in determining this sensitivity of youth to adult rates of unemployment, and notes the importance of country specific factors. Italy is shown to be one of the countries with the highest sensitivity to cyclical shocks. Bruno, Marelli and Signorelli (2014) investigate the determinants of spatial variations in regional youth NEET in the EU rates, and draw comparisons with respect to youth unemployment and adult unemployment rates. They place particular emphasis on the impact of the Financial Crisis and consequent Great Recession. They show that NEET rates are persistent, falling as regional economies grow, as one would expect, but exhibited less persistence during the crisis period. It is also shown that regions in the southern parts of the EU (e.g. Italy) have more persistent NEET rates and that there is a ‘spatial propagation’ of NEET rates between contiguous regions. These differences in the pro-cyclicity of youth to adult unemployment rates are likely to reflect demand shocks wherein firms respond by cutting recruitment, especially in branch plants, and/or adopting ‘last-in-first-out’ redundancy policies, both of which disproportionately affect younger workers. If wages are rigid downwards, which is possible due to the presence of strong unions, or overly generous benefit systems, then youth unemployment and NEET rates will rise, suggesting that youths bear the brunt of business cycle fluctuations (see Canziani and Petrongolo, 2001; Jimeno and Rodriguez-Palenzuela, 2003; Bertola, Blau, and Kahn, 2007; Kahn, 2007; Modesto, 2008; and Kawaguchi, 2011).⁶

⁶ Kelly and McGuinness (2015) investigate the determinants of the incidence of youth unemployment and NEET pre- and post- the Great Recession, and also investigate changing patterns in transition behaviour. They use individual longitudinal data from Ireland’s Quarterly National Household Survey 2006: Q2 (boom) to 2011: Q2 (recession). They find statistically significant ‘regional’ effects, which vary between unemployed youths,

Young people also tend to concentrate in certain cyclically sensitive industries, and, as we have shown above, are more likely to be in non-standard employment, such as involuntary temporary and part-time jobs. Given the uneven distribution of cyclically sensitive industry and of non-standard employment, it is likely that demand shocks will have an uneven spatial impact. However, Perugini and Signorelli (2010) find for western regions of the EU that higher shares of primary and construction industry do not have a statistically significant effect on regional youth unemployment rates, whereas a higher share of manufacturing industry reduces youth unemployment. Traditional services benefit females only.

Turning to the supply side, there has long been a view that less educated and less skilled youths will face a higher risk of unemployment, hence regions with a higher share of these groups are likely to have higher youth unemployment and NEET rates (Scarpetta et al, 2010). The OECD *Jobs for Youth* review identified two groups that face particular difficulties in getting a stable job after leaving school: one group are labelled the “youth left behind” and the other are referred to as the “poorly-integrated new entrants”. The former are those young people who lack qualifications, come from an immigrant or minority background and live in disadvantaged or remote backgrounds. According to Scarpetta *et al* (2010) the size of the ‘youth left behind’ group can be proxied by the number of young people in NEET. All countries are seen as having a group of “youth left behind”, whereas the number of “poorly-integrated new entrants” is particularly large in Italy and Spain, along with France and Greece. Poorly integrated youths tend to move between unemployment, inactivity and temporary work and may have some qualifications and work experience. Quintini and Manfredi (2009) show that those countries with a strong apprenticeship system and/or a less regulated labour market, such as Germany and the United Kingdom, tend to have more young people who perform well in the labour market because they have vocational qualifications, or because they can more easily move between unemployment and jobs. However, Scarpetta *et al* (2010) also argue that the difference in employment rates between those young people with tertiary and lower secondary education is more compressed in Spain and Italy than in Britain, which implies they also have higher graduate unemployment rates.

Reviewing the previous literature on the relationship between the share of youths in the workforce and other labour market outcomes, Korenman and Neumark (2000) argue that increases in the share of youths is associated with an increase in youth unemployment rates relative to the adult unemployment rates. However, Shimer (2001) adopts a state-level analysis, and shows that an increase in the youth share of the workforce reduces the youth unemployment

the NEET group and prime aged adults, and by the stage of the business cycle.

rate, with an estimated elasticity of -1.5. Shimer suggests that one reason for this difference in the findings is that most previous work has ignored the relationship between the share of youths and the prime age unemployment rate, which he shows to be important. Perugini and Signorelli (2010) also investigate the impact of the share of young people in a region, which is shown to be statistically insignificant, however, they do find evidence of spatial dependence, reflecting spill over effects between youth unemployment rates in neighbouring regions. These findings imply that it is important to investigate the spatial interdependence of ‘regional’ labour markets.

3. DATA AND DESCRIPTIVES

Our focus is upon Italy, Spain and the UK. With regards to our choice of countries, the persistence of regional disparities in adult unemployment rates in the three EU countries chosen for this study are well known (Taylor and Bradley, 1996; Bande, Fernandez and Montuenga, 2007; Bande, 2014; see also Zeilstra and Elhorst, 2014), however, this cannot be said with respect to their youth unemployment and NEET rates. The three countries are also interesting in their own right and have had very different unemployment experiences. Scarpetta et al (2010) show that Italy, Spain and UK are clustered at the upper end of the OECD league table for the percentage of youths inactive and NEET, exceeded only by Turkey and Mexico. Indeed, in 2014 and 2015 two Spanish regions (Castilla-La Mancha and Andalucia) and one Italian region (Calabria) had youth unemployment rates in excess of 60 percent in either of these two years (Moller, 2017). Furthermore, the magnitude of youth unemployment rates and their dispersion is highest in Italy, Spain and Greece and at intermediate levels in Britain, for instance (Moller, 2017). Iammarino et al (2018) provide a detailed analysis of regional inequality in Europe, classifying regions into low, medium, high and very high levels of development. Italy has a mixture of high, medium and low regions moving from north to south, whereas Spain is mainly split between medium and low regions. The UK is dominated by medium level regions, except for parts of Wales which is low and the South East, including London which is very high. This diversity of regional economic development is a further justification for the selection of Italy, Spain and the UK in this study.

We use data from the Italian, Spanish and UK Quarterly Labour Force Surveys for the period 1993-2018. Each of these datasets contains random samples of the workforce in the respective countries over 5 consecutive quarters. The UK Labour Force Survey (LFS) is a household sample survey conducted on a quarterly basis, each quarter containing information on approximately 80,000 households and 120,000 individuals. In each quarter, there are five waves of respondents, which are included in the survey five consecutive times. New waves replace those waves sampled in five consecutive quarters, which means that there is an 80%

overlap of observations between consecutive quarters. Similarly, the Spanish Labour Force Survey is a rotating quarterly survey with a sample size of approximately 65,000 households per period and around 180,000 individuals. The sample is divided into six rotation groups, and the sixth group is renewed each quarter, which means that in any two consecutive quarters there are five overlapping rotation groups and five sixths of the sample in any two consecutive quarters can be matched. The Italian Labour Force Survey is also a quarterly survey, but with a 2-2-2 rotating pattern. Households participate for two consecutive quarters, and then they exit for the following two quarters, coming back into the sample for next two consecutive quarters. Hence, 50% of the households that are interviewed in a quarter are re-interviewed after three months, 50% after twelve months, and 25% after nine and fifteen months.⁷ The target size of the annual sample is 286,144 households, however, in each year a new sample of approximately 71,000 sets of four households (corresponding to a total of 286,144) is drawn in order to compensate for non-responding households.

We aggregate individual level data to the regional level by year and quarter so that we end up with a panel of regions observed quarterly for the time-period 1993-2018. It is important to use quarterly data because of the dynamic (and seasonal) nature of youth labour markets in most countries. These data allow us to construct a number of personal and household variables, as well as distinguish between young people and adults. However, we also map on to each region variables reflecting industrial structure and GDP growth rates, for example. Table A1 in the Appendix provides descriptive statistics for all variables.

There is some dispute about the definition of youth and of the NEET group. In terms of the definition of youths we start with the 16-24 age group, however, we also identify the ‘teenage’ group (aged 16-19), which includes school leavers, who often face particular difficulties in making the transition from school to the labour market. Older youths (aged 20-24) and teenagers are likely to exhibit different behaviour in the labour market, with teenagers moving more often between jobs education and NEET, as well as being less geographically mobile. Young adults are likely to have more work experience and accumulated human capital. For each group, we adopt the LFS definition of unemployed as those young people who are ‘...actively seeking work in the last 4 weeks and willing to accept a job offer at the market rate...’ As suggested in the Introduction, there is some discussion on the definition of the NEET group. Generally, we regard them as the unemployed plus the so-called ‘economically inactive’, where the latter includes the following young people:

⁷ The LFS sample used from 2004 was re-designed in order to satisfy the Eurostat requirements contained in Council Regulation 577/98. However, the general structure of the sample did not change.

- Spain – the inactive are those young people who are potentially active, including those not motivated, but excluding the following groups - students, retired or pre-retired, housewives or disabled individuals who are not available for work.
- Italy – the inactive are those young people who are: looking for their first job, housekeepers, unregistered unemployed, or out-of-the-labour force but looking for a job, out-of-the-labour force not looking for a job but available to work, and those out of the labour force but not currently available to work.
- UK- the inactive are those young people who are economically inactive but looking for, or willing, to work excluding the retired and those individuals who are looked after and/or injured.

This approach to defining the NEET category allows as much consistency between each country as possible, although we acknowledge that the UK differs slightly by including those willing to work. Nevertheless, we believe that our definitions for each country are broadly comparable.

Table 1 provides some descriptive evidence of the magnitudes of youth unemployment and NEET rates for the regions of Italy, Spain and the UK. This table reports the best five and the worse five regions for each country based on the rate of youth unemployment (15-24 years). It also compares this rate to the NEET rate for the beginning and end points of this study. It is clear that there is considerable variation between regions within countries in terms of youth unemployment rates and NEET rates. For instance, in Italy there appears to be a clear north-south divide – in regions such as Campania and Sicilia one in two young people are unemployed whereas in Trentino-Alto Adige, for instance, it is one in ten youths that are unemployed. Youth unemployment in the best performing regions of Spain are higher than the worse performing Italian regions, however, the best performing Spanish regions have much higher youth unemployment rates than the best performing Italian regions. There are also wide variations in youth unemployment rates between the UK regions with Outer London and other parts of the North being the hardest hit. Nevertheless, youth unemployment rates are much lower in the UK regions when compared with both Italy and Spain.

NEET rates are more similar in magnitude in the different countries. NEET rates in Italy are smaller and the variation between the best performing regions and the worse performing regions is much wider than in the UK and Spain. The NEET rates in the best performing regions of Italy are in the north, at 7-10 per cent, with the exclusion of Trentino Alto-Adige, a small region with special status. In the south of Italy, the NEET rate reaches a peak in Sicily at 26 per cent, followed by Campania and Calabria where the rate is slightly

smaller. In Spain, the picture varies from one out of ten youngsters not in education, employment or training in Navarra, which is the best performing region in terms of employment, to one in six in Andalucia, which is the worst performing region in terms of employment. In the UK, it moves from one out of ten in the best employment performing regions to one in six in the worst employment performing regions, such as Tyne and Wear.

Figure 1, which focuses on a single year for illustration, shows that there is a strong correlation between (all age) youth unemployment rates and adult unemployment rates.⁸ Regions in the top right of the figure clearly have significant youth and adult unemployment problems. As shown in Table 1, Spanish regions exhibit the worst youth unemployment problems with the UK the least affected; Italian regions overlap to a certain extent but the best performing Italian regions are comparable with the best performing UK regions.

Figures 2-4 investigate changes over time in the experience of regions with respect to youth unemployment and NEET rates, with a particular focus on events pre- and post- the Great Recession (hereafter recession). Specifically, we plot percentage point changes in the all-age youth unemployment rates, for instance, in 1993-2007 against the equivalent for the period 2009-2013 (the top left panel). The former is a period of falling unemployment rates whereas the later period follows the recession when rates were rising. The top right graph shows percentage point changes in 2009-2013 versus the most recent period 2014-2018 to see whether regions have recovered following the Recession. In the bottom left and bottom right graphs of each figure we repeat the analysis for NEET rates. The red bars are the average changes in unemployment rates for the respective period which allows us to examine where regions are in each quadrant. In summary, these figures provide an insight into the dynamics of regional youth unemployment and NEET rates.

Figure 2 presents the experience of Italian regions, which can be characterised as falling somewhere between the Spanish and UK experience. Regions such as Liguria (Lig), Molise (Mol) and Calabria (Cal) have experienced large decreases in youth unemployment between 1993-2007, but have then seen substantial increases following the recession over the later period (top left). This deterioration in youth unemployment rates is also seen in the later period (top right) where these three regions experience very substantial increases. It is interesting to contrast the experience of these regions with ones such as, Friuli Venezia Giulia (FGV) and Lombardia (Lomb) which experience modest decreases in youth unemployment in the early period only to be cancelled out in the latter period (top left). However, the top left graph shows that both regions fare much better than most in the latest time period. A similar story emerges

⁸ Table A2 in the Appendix provides a description of each acronym used in the Figures.

with respect to NEET rates.

In the case of Spain (Figure 3), there is a clear upward shift in youth unemployment rates following the recession (see top left), but this is less pronounced for the NEET group (see bottom left). It is also instructive to compare the experience of particular regions, for instance, Pais Vasco (PV) had experienced falling youth unemployment rates in the 1993-2007 period, which was then partially offset by a substantial increase in its youth unemployment rate in the recession period. However, in the later period (top right) this region did experience further reductions in youth unemployment rates suggesting that the recession did not leave a lasting scar. The same is true for its NEET rate (bottom right). In contrast, region (CV) had experienced a substantial reduction in youth unemployment in the early period which was cancelled out following the recession in the later period (top left), and was followed by a further substantial reduction in the most recent period (top right), suggesting that it recovered quite quickly from the recession. The NEET rates for this region behave similarly, albeit with lower orders of magnitude.

Figure 4 shows the experience of the UK. It should be noted that the scales on each of the graphs in Figure 4 are substantially lower than those for Italy and Spain. Nevertheless, it is clear that regions did respond differently to the recession with a cluster in the top left graph who experienced decreases in their youth unemployment rates (1993-2007) only to see these improvements more or less reversed by the recession e.g. Strathclyde (Str). Interestingly, regions such as Merseyside (Mer) did not experience a substantial increase in youth unemployment over the period 2009-13 following the recession. In fact, the top right graph shows that this region experienced a substantial fall in their youth unemployment rate over the period 2014-18, as did Strathclyde. The South West (SW) and the East Midlands (EM) seemed to have fared well over the whole period 1993-2018. A similar story emerges with respect to NEET rates, with far greater clustering of experience in the later period (see bottom right graph).

In summary, the descriptive analysis in Table 1 and Figures 2-4 show that there are significant differences in the youth unemployment and NEET experiences within and between countries. Responses to the 'recession' also differ. What is less clear from the Table and the Figures, however, is the variability in spatial disparities. Table A1 shows the coefficient of variation over time for each country, and shows that there is substantial variability in youth unemployment and NEET rates, especially in Italy. This variability in regional performance is much less following the recession. This variation needs to be borne in mind when we investigate the determinants of youth unemployment and NEET rates, especially given our aim to identify 'common' determinants.

Table A2 reports the means and standard deviations for all of the covariates used in our empirical models.

4. EMPIRICAL FRAMEWORK

4.1 Statistical models

Our econometric strategy has two parts. The first part involves the estimation of a simple OLS model for each country, including covariates that are suggested by the theory and literature, in addition to those that we can generate from each LFS. An example is the percentage of immigrants in the region. We also estimate a model with regional dummies to capture differences in climate, amenities, innovation capacity and institutions. Thus, we estimate models of the form:

$$U_{ith} = \alpha + \beta U_{th}^a + \rho X_{ith} + \mu_{ih} + \tau_t + \varepsilon_{ith} \quad (1)$$

where U_{ith} is our measure of the youth unemployment rate of region i in year t in country h , U_{th}^a is the national adult unemployment rate for country h , at time t . The vector X includes other variables that capture equilibrium determinants of regional youth unemployment rates, such as industry mix, the number of Small and Medium Sized Enterprises (SMEs) in the region, as well as measures of the stock of human capital and measures of competition for jobs. These latter variables include the percentage of married females over 24 years of age in the region and the percentage of immigrants. μ_{ih} are unobserved region specific fixed effects capturing amenity effects and the effects of climate. τ_t are time dummies for each quarter and ε_{ith} is a mean zero, normally distributed random error. We also estimate a model where the fixed effects are interacted with a yearly time trend to remove the effect of time varying unobservables. In addition, we estimate equation (1) with a dummy variable for the Great Recession and investigate the role of U^a as a measure of the business cycle. The models of the NEET rate are specified identically to those models for the youth unemployment rate.

The second part of our econometric strategy is based on the estimation of a spatial autoregressive panel model (Anselin, 2008), which takes the following form:

$$U_{ith} = \alpha + \gamma WU_{-ith} + \rho X_{ith} + \mu_{ih} + \tau_t + \varepsilon_{ith}, \quad (2)$$

where $WU_{-ith} = \sum_{j \neq i} \omega_{ij} U_{jth}$ is the weighted average unemployment rate of the neighbouring region j at time t in country h ; ω_{ij} are exogenously chosen weights that aggregate the unemployment rate of neighboring regions into a single variable WU_{-ith} . The ω_{ij} are normalized so that $\sum_{j \neq i} \omega_{ij} = 1$. X_{ith} is a matrix of demographic as well as measures of industry mix of region i at time t in country h . Equation (2) has a more parsimonious specification when compared to equation (1), excluding, for instance, the national adult unemployment rate which could be regarded as a poor proxy for the business cycle. μ_{ih} are unobserved region specific fixed effects, τ_t are time dummies for each quarter and ε_{ith} is a mean zero, normally distributed random error.

In equation (2), the coefficient γ measures the spatial interdependence in the regional unemployment, which is the reaction of the unemployment rate of a given region to a one per cent increase in the average unemployment rate of its neighbours.

4.1 Identification of the spatial model

The average neighbouring unemployment rate WU_{-ith} , is endogenous because unemployment interactions are symmetric and simultaneous: the behaviour of each region's unemployment rate directly affects that of its neighbours and it is similarly affected by their behaviour. These effects can arise because of the trade 'linkages' between industries in spatial clusters, which results in a common response to economic shocks, and because of competition for jobs, particularly from adults, in neighbouring regions. Therefore, the OLS estimation of equation (2) is inappropriate as it generates biased estimates. Thus, we adopt an instrumental variable approach, where at the first stage the endogenous variable WU_{-ith} is instrumented by the weighted average of the proportion of young people in the neighbouring regions, $WY_{-ith} = \sum_{j \neq i} \omega_{ij} Y_{jth}$. Our justification for the choice of this instrument is that, in a given region, is primarily a function of birth rates which are exogenous. Thus, variation in the number of young people has a direct effect on the unemployment rate of that region but it does not significantly affect the neighbouring regions' rates of unemployment. However, we have to assume that the number of young people in region j do not compete for jobs in region i , because they are less mobile than their adult counterparts, due to income constraints with respect to transportation, or because they are less likely to migrate from high unemployment to low unemployment

regions. This is likely to be the case for the teenage group in particular, however, there is evidence that older youths are more likely to live with parents for longer, especially in Italy (around 88 per cent of those aged 16-29) and Spain (Billari, 2004; Iacovou, 2001).

As a sensitivity check we also used a different instrument – total EU development and social funding which are designed to support a region’s economic development (European Regional Development Fund), and hence its unemployment rate, or support projects aimed at specific groups, for instance, the young (European Social Fund). Our justification for this instrument is that, because of its targeted spatial effect it should have only a direct effect on youth unemployment and NEET rates in a given region and no direct effect on its neighbouring regions. The greater the level of EU funding for a region, the lower the rate of youth unemployment and NEET rates are *expected* to be.

Finally, we turn to the specification of the weighting matrix. It is obtained using contiguity weights, defined as $\omega_{ijh}=1/n_{ih}$ where n_{ih} is the number of regions contiguous to i in country h , and $\omega_{ijh}=0$ if regions are not contiguous. These weights capture the idea that spatial interactions are only between geographically neighbouring regions and therefore local governments are likely to react only to what their geographical neighbours do.

To reiterate we estimate equation (2) for all four dependent variables: teenage unemployment rates (16-19), all age youth unemployment rates (16-24) and the NEET rate counterparts. Table A2 provides a definition of each variable included in our models, whereas Table A3 provides further summary statistics.

5. RESULTS

5.1 *The determinants of spatial variations in youth unemployment and NEET rates*

The effects of the business cycle: To pick up the effects of the business cycle, and hence demand shocks, on youth unemployment and NEET rates we include as a covariate the national adult unemployment rate. Recall that young people who are new entrants to the labour market (i.e. 16-19 year olds) may be at the back of the labour queue and may be the victims of LIFO redundancy policies implemented by firms, which means that they are more sensitive to business cycle fluctuations, especially downturns. Table 2 shows that there is evidence of a statistically significant relationship between national adult unemployment rates and regional rates of youth unemployment for 16-19 year olds (teenage rates), except for Italy. In Spain, an increase in the national adult unemployment rate of 1% leads to a 2.2% increase in the regional

teenage youth unemployment rates (see model 3). The effect for the UK is similar but only when we include regional fixed effects and interact this with a period trend. In terms of the total youth group (16-24 year olds), a different story emerges (see Table 3). For this group, there is consistent evidence across countries of a statistically significant and positive correlation between the national adult unemployment rate and youth unemployment rates. The effects are larger for Italy and the UK (see model 3) but smaller in magnitude to the teenage effect in the UK. In all three countries, total youth unemployment is sensitive to changes in aggregate demand conditions. As demand falls, reflected by the increase in national adult unemployment rates, youth unemployment increases by more, suggesting that older youths are more cyclically sensitive than teenagers are.

In terms of the NEET rate, there is evidence of a positive relationship between the national adult unemployment rate and teenage regional NEET rates in all countries when we control for regional fixed effects interacted with a time trend (with larger effects in the UK – see Table 4, Model 3). These effects are lower than the effects for the teenage unemployment rate (see Table 2). Table 5 reports the findings for the 16-24 group, where a consistent pattern is observed – as adult unemployment rises, the 16-24 NEET rate also rises but the amplitude is less, except for the UK. Taken together, the results for teenagers and all youths implies the presence of a discouraged worker effect, which is more pronounced for older youths than it is for teenagers. One possible explanation for this is that teenagers may see further education as a more desirable option than dropping out of the labour market, simply because of the fact that they have more recently completed their compulsory education. However, it is also the case that because the amplitude of the NEET rates are generally less than 1, this implies that fewer young people drop out of the labour market into economic inactivity when the economy is slack.

To capture the effect of the Great Recession we included a dummy variable for the period 2007-2008 along with the national adult unemployment rate and lagged regional real GDP. There is almost no change to the adult unemployment rate estimates, and the effect of the recession variable is mixed. The estimates for Italy are statistically insignificant and less than 1, whereas the effects for the UK and Spain are positive, statistically significant and greater than 1. The exception is Model 3. For the UK and Spain there is therefore evidence that the recession had a significant effect in raising youth unemployment and NEET rates.

Given that the national adult unemployment rate does not accurately pick up business cycle effects, because of labour hoarding and redundancy payments which could delay job search, we drop the adult unemployment variable to see what effect, if any, there is on the lagged regional real GDP variable. This is a more accurate proxy for product demand. There is very little evidence of a change in the magnitude of the effects reported in Tables 2-5 however,

more of the estimates are statistically significant especially in the case of the UK and Spain (models 1 and 2). We therefore retain our original specification.

The effect of competition for jobs: In this section, we investigate the effect of competition between sub-groups of the labour force for jobs. Young people face competition from each other for available jobs, however, they have often faced competition from married females who have been willing over time to take on ‘entry level’ jobs. More recently, young people may have faced increased competition for jobs from immigrant workers, especially with respect to less skilled jobs, which implies larger effects for teenagers. There is a consistent story from Tables 2-5 - the higher the percentage of married females in a region the lower the youth unemployment and NEET rates are, implying that young people are actually ahead of married females in the jobs queue. These effects are larger in the case of Italy and of smaller magnitude for the NEET groups. For Italy, these effects could reflect the cultural factors, as suggested above, whereas for the UK and Spain the reasons are less clear-cut. Note, however, that the effect of married women on youth unemployment and NEET rates tends to become much smaller, and statistically insignificant, when we include regional fixed effects interacted with a time trend. This implies that time varying regional amenities may play a role.

In terms of competition from immigrant workers, the LFS data only enables us to measure the size of this group in each region of the UK and Spain. The estimated effects in Tables 2 and 3 suggest that a higher percentage of immigrants in a region, the greater the increases in regional youth unemployment rates, and this effect is larger for teenagers when compared to the total youth group. In terms of NEET, Tables 4 and 5 also show that a higher percentage of immigrants in a region increases the NEET rate in Spain, and the size of these effects is similar for different youth groups. In sum, these results do suggest that either immigrant workers out compete young workers, or young workers are unwilling to accept some types of jobs that they are qualified for.

The quality of jobs: We include two variables to try to capture the relationship between job quality and regional youth unemployment and NEET rates. The first is the percentage of the regions’ workforce in temporary jobs and the second is the percentage in part-time jobs. Both of these factors have been investigated in the previous literature, and for young people at least, can be regarded as more ‘marginal’ jobs in terms of the prospects and wages.

With respect to teenagers (see Table 2), there is a negative and statistically significant correlation between temporary jobs and unemployment rate for Spain, whereas the estimates for the UK and Italy are generally statistically insignificant. This implies for the former that

teenagers do see temporary jobs as a way of avoiding unemployment. A different story emerges for the total youth group (see Table 3). For Italy and Spain the estimates are negative and statistically significant, suggesting that youths do see temporary jobs as an acceptable route into the labour market, and so the larger the percentage of temporary jobs in a region the lower the unemployment rates of older youths. In terms of NEET, a similar story emerges for teenagers (see Table 4) and all youths (see Table 5) but only for Italy. The larger the share of temporary jobs in the regions of Italy the lower the NEET rate, especially for older youths. In summary, the availability of temporary jobs leads to different responses amongst youths, depending on the country and the age group.

There is evidence of a correlation between part time jobs and unemployment rates, insofar as a higher proportion of such jobs in a region the higher the teenage unemployment rate in all countries. These effects remain for the all youth group but are smaller in magnitude, implying that teenagers have lower preferences for part time jobs. Similarly, a larger percentage of the workforce in a region in part time jobs, the higher the NEET rate (see Tables 4 and 5), however, these estimates tend to be smaller than the estimates for youth unemployment rates.

This analysis suggests that teenagers and older youths have different preferences for temporary and part time jobs, depending also on whether they are unemployed and relatively more attached to the labour market compared with those youths who are out of the labour market.

The effect of skills and education: As a measure of the stock of highly educated and most likely highly skilled workers in the region, we use the percentage of youths in the workforce with a higher education qualification. Regions with a greater stock of higher educated workers should have lower rates of youth unemployment and NEET. This is because such workers are likely to be in greater demand by employers, are hoarded during economic downturns and are one attractor for inward investors. Of course, it is also possible that highly educated youths are competitors for unqualified youths, especially teenagers.

Our evidence on the effect of the stock of human capital on youth unemployment and NEET rates is consistent in terms of the sign and size of the effect, especially for teenagers in the UK and Italy. For the UK, there is evidence that the greater the stock of highly educated youths in a region, the lower the rate of teenage (Table 2, model 3) and all age youth unemployment rates, whereas there is a negative effect for the all age (Table 3) youth unemployment rates (Table 3, model 3). These findings imply that teenagers and older youths are able to compete for available jobs. The evidence for Spain and Italy is less robust, a similar story emerges for Italian teenagers as

for UK teenagers.⁹

A higher stock of highly qualified youths in a region reduces youth unemployment rates for teenagers, regardless of whether we include regional fixed effects or not.⁶ Education and training therefore matters. Thus, although highly educated youths do compete for jobs with other highly educated workers, there is evidence that having a degree does reduce the risk of youth unemployment. The evidence for the NEET groups is more consistent. For all three countries, a more highly educated youth workforce reduces NEET rates, except for older youths in Italy, hence helping to mitigate discouraged worker effects, which is consistent with our findings on teenage youth unemployment rates.

The effect of industry mix and labour demand: We include in our model a variable to capture the percentage of regional employment in manufacturing and construction industry in an attempt to capture the availability of jobs that have typically attracted young people. The size of the SME sector in each region is also included for similar reasons.¹⁰

Regions with a higher percentage of the workforce employed in the manufacturing and construction reduces youth unemployment in all countries for both teenagers and the total youth group. These effects are largest in Italy and Spain, with the size of these effects falling when we include regional fixed effects – see models 2 and 3. In terms of the effect of the availability of SMEs as a source of youth employment, a larger number of SMEs in a region tends to have a negative, and statistically significant, effect on all age youth unemployment, especially in the case of Spain. There is no statistically significant effects for teenagers in the UK or Spain. A different picture emerges with respect to the NEET rate insofar as a larger SME base in the region reduces teenage and all age NEET rates, especially in the UK, with larger effects for the all age NEET group. One explanation could be that these young people possess more experience, which SMEs are likely to require – recruiting teenagers who would require training is a cost that many SMEs could not afford.

The effect of youth labour supply: Above we discussed the possible effects of the supply of young workers on youth unemployment rates. Table 2 suggests that there is evidence that a higher percentage of youths in the working age population has a positive effect on teenage

⁹ But note that in Italy in absolute terms there are fewer HE graduates in Italy than in the UK and Spain, so reducing the stock. Also, the average age of graduation in Italy is also relatively high, around age 24, so this group is less likely to be in direct competition with youths for jobs. Thus, when the number HE undergraduates increases, this reduces labour supply at lower ages thereby reducing youth unemployment.

¹⁰ We omit the SME variable for Italy because it is not measured in a way comparable to the UK and Spain, and leads to very large constant terms implying that there is a measurement problem with this variable.

unemployment rates (see model 3 in particular). A similar picture emerges for the all age youth group, although the evidence for the UK is less robust insofar as the estimated effect, although positive, becomes statistically insignificant when we include a regional fixed effect interacted with a time trend. In terms of the NEET rate, there is systematic evidence that a larger percentage of youths in the region increases the teenage NEET rate in all three countries. The largest effects are observed for the UK and Spain when we include fixed effects. For Italy, we only observe a statistically significant effect when we include fixed effects. There is evidence of a similar effect for the total youth group (see Table 5), and these effects are similar in magnitude to those for teenagers, except for the UK where these effects are smaller.

5.2 Spatial clustering of youth unemployment and NEET rates

In this section, we report the results from estimating Equation 2 in section 4. Our objective in this section is to investigate whether there is any evidence of spatial clustering in youth unemployment rates and NEET rates, and how this clustering varies between Italy, Spain and the UK. Recall that we treat unemployment rates and NEET rates in neighbouring, or contiguous, regions as endogenous (termed a ‘spatial neighbour effect’). To overcome this problem, we initially use the neighbouring regions youth labour supply as an instrument, because this is determined by birth rates and net migration flows, for instance. We also disaggregate our analysis by teenagers and young adults since the previous analysis has shown that these two groups behave differently. Tables 6 to 9 show the results for the spatial autoregressive model, and its instrumented version together with the first stage. We also report the F-test which confirms the instrument validity.

In Table 6, we report the estimates of youth unemployment for the 16-19 year old group. For the UK, the spatial AR coefficient, reported in the first column, is positive and significant, and suggest that a 10 per cent increase in the youth unemployment rate in the neighbouring regions increases the regional rate by around 4.9%, this effect rises to substantially to 12.2 % in the IV model (column 3). For Spain, we observe similar effects although slightly larger in magnitude, for example looking at the second stage (column 6) the increase in youth unemployment is around 9%, still assuming a 10% increase in the neighbours’ rates. For Italy, the spatial AR coefficient is smaller than the estimates for the UK and Spain but remains positive and statistically significant. These results suggest that there are different spatial processes at work in Italy. In terms of the 16-24 year old group, see Table 7, the spatial AR estimates for the UK are much larger than those observed for teenagers, whereas the estimates for Spain and Italy are similar to those for their teenage counterparts (see column 6 and 9,

respectively).

Overall, there is a consistent story insofar as, once we allow for the endogeneity of youth unemployment rates, higher youth unemployment rates in neighbouring regions do spillover and increase youth unemployment rates in a particular district. Competition for jobs is one plausible explanation. It is also worth noting that our instrumental variable in the first stage regression – the log of the number of young people – is statistically significant and positive, and the LM test suggests it is a valid instrument.

In Table 8 we show the results for the NEET rates of the 16-19 year old group. The spatial AR coefficient for the UK almost triples in size once we control for endogeneity (from 0.4 to 1.1), suggesting that a 10% increase in the neighbours NEET rate increases the regional NEET rate by 11%. There is a similarly large effect for Spain, whereas the effect for Italy is much smaller than the estimated effects for the UK and Spain. With respect to the 16-24 age group, Table 9 shows that the effect of the neighbours NEET rate is much larger and statistically significant. For Spain and Italy, the spatial spillover effects are smaller than for the UK and similar in magnitude to the estimates for teenagers. For all countries, the first stage results confirm the goodness of the instrument used.

Finally, we experiment with a different instrument – EU total funding – for the reasons explained above. The estimated effects of the neighbouring EU funding on the neighbouring unemployment and NEET rates (first stage of the IV model) is positive. This is contrary to our expectations, since we expected the opposite sign. We suspect that high unemployment regions attract higher levels of EU funding and this mechanism might generate a cycle over time, that is, possible reverse causality. However, in the second stage, our results are still in line with the previous IV models. Indeed, we find that the spatial spillover effects are positive and statistically significant in all specifications for unemployment and NEET.

Specifically, the estimates (available upon request) for the teenage youth unemployment group are slightly smaller than those reported in Table 6, except for Italy. Whereas, the effects for the all age models are slightly larger than those reported in Table 7, except for the UK. The results for the NEET models for the teenage group are smaller than those reported in Table 8, except for Italy. Whereas, the effects for the all age group are larger than those reported in Table 9, except for the UK. These findings are reassuring insofar as we observe a relevant presence of spatial interdependence in the regional unemployment, without switches of sign in the estimates and reduction in statistical significance.

Overall, for all countries, and across all IV models and age groups the estimated effects suggest a statistically significant positive effect of neighbouring regions unemployment and NEET rates on region i 's unemployment and NEET rates. The spatial neighbour effects tend to

be slightly larger for spatial neighbour unemployment rates when compared with the effect of spatial neighbour youth NEET rates. This is expected, given the fact that the NEET group includes those young people who are not engaged in any form of employment, education or training, and who are presumably discouraged workers.

In sum, there is clear evidence of spatial clustering of youth unemployment and NEET problems, the latter suggesting a spatial clustering of discouraged workers. Why do we observe these effects? There are several possible reasons. First, in the case of the UK and Spain, the spatial agglomeration of industry is likely to play a part insofar as spatially peripheral regions tend to have a higher preponderance of cyclically sensitive firms who trade with one another. In the case of Italy, where several regions are heavily clustered in a North-South divide, there may be less trade between industries hence clusters in the North, for instance, are ‘independent’ of clusters in the South. Second, clusters of high unemployment or NEET youths may be unattractive to domestic or foreign companies considering where to locate. This is compounded by the fact that these areas also tend to have a smaller pool of highly qualified youths, for instance.

5. CONCLUSIONS

In this paper, we have two objectives. The first objective is to investigate the determinants of regional variations in youth unemployment and NEET rates. Specifically, we investigate the determinants of quarterly regional unemployment and NEET rate differences for Italy, Spain and the UK for the period 1993-2018. A second objective of the paper is to assess whether there is spatial neighbour effect of contiguous youth unemployment and NEET rates on a region’s youth unemployment or NEET rates. Given the likely differences in labour market behaviour, we disentangle the effects for teenagers from total youth groups. To achieve these objectives, we use individual ‘worker’ level LFS data, collected quarterly, for each country for the time-period 1993-2018, which we aggregate to the regional level. By using LFS data, we are able to account for a richer set of covariates.

Our econometric results suggest that there are a number of common factors, which increase youth unemployment and NEET rates, especially in the cases of Spain and the UK. For instance, regional youth unemployment rates tend to rise when adult unemployment increases, and there is some evidence that teenagers are more sensitive to aggregate labour market conditions than the 16-24 age group, except for Italy. A more muted effect is observed with respect to the NEET rate, which is to be expected given that this group contains a higher proportion of discouraged workers. There is also some evidence that a larger percentage of immigrants in a region increases

youth unemployment rates in the UK and Spain, especially for teenagers. A further common finding is that industry mix and the percentage of SMEs in a region serve to reduce all age youth unemployment rates, reflecting demand-side effects. On the supply side, a common finding is that a higher percentage of highly qualified youths in the workforce tends to reduce youth unemployment rates. Our evidence is mixed with respect to the size of the regional youth population.

There is also evidence, for all countries, of positive and statistically significant spatial interdependence in the regional unemployment, although the magnitudes of these effects are smaller. The results are confirmed using two IV models.

Our findings raise obvious implications for spatial economic and labour market policies, which need to be targeted and focused. Barca, McCann and Rodriguez-Pose (2012) review the literature on place versus people policies, including some influential international reports, which have helped to shape government policy towards regions, for instance, in both developed and developing countries. They argue that policy has often over-emphasised a ‘top-down, supply-side, one-size-fits-all’ (p3) approaches which are quick fixes and unbalanced in their approach. Given the relative immobility of youth labour, especially amongst the NEET group, together with the stark regional disparities analysed in this paper, it is essential that place-based policies are centre stage, supported by Active Labour Market policies. Furthermore, Barca et al (2012) point to evidence suggesting the need for ‘integrated regional policies’ with a coherent approach to infrastructure development, investments in schooling and training, assistance with job search, the development of SME and other businesses and the stimulation of innovation. In sum, regional policy should consider demand and supply-side factors. However, institutions, political structures, the local knowledge (i.e. social capital) are also key, insofar as they can ensure that the integrated regional policies are adapted to local circumstances so avoiding the one-size-fits-all approach that has previously been adopted to alleviate regional disparities in unemployment and economic growth. The objectives of this approach are to stimulate local (regional) economic growth, including through geographical spillovers, which will then help to reduce the wide disparities in youth unemployment and NEET rates, and hence help to also stimulate higher aggregate (national) economic growth.

REFERENCES

- Anselin, L. (1988) *Spatial econometrics: methods and models*, Kluwer Academic Publishers, Dordrecht.
- Ammermuller, A., Lucifora, C., Origo, F. and Zwick, T. (2010) Wage flexibility in regional labour markets: Evidence from Italy and Germany, *Regional Studies*, 44, pp401-421.

- Armstrong, H. and Taylor, J. (1988) *Regional Policy and the North-South Divide*. Employment Institute, London.
- Bande, R. (2014) Spanish regional unemployment revisited: The role of capital accumulation, *Regional Studies*, 48, pp. 1863-1883.
- Bande, R., Fernandez, M. and Montuenga, V. (2007) Regional Disparities in the Unemployment Rate: The Role of the Wage-setting Mechanism in Spain, 1987–92, *Regional Studies*, 41, pp. 235-251.
- Barca, F., McCann, P. and Rodrigues-Pose, A. (2012) The case for regional development intervention: Place-based versus place-neutral approaches, *Journal of Regional Science*, 52, 134-152.
- Bertola, Giuseppe., Blau, Francine D., and Kahn, Lawrence, M. (2007). “Labor market institutions and demographic employment patterns” *Journal of Population Economics*, 20, 833-867.
- Billari, F. (2004). Becoming an adult in Europe: A macro/micro-demographic perspective. *Demographic Research*, 3, 15–44.10.4054/DemRes.2004.S3.2
- Blanchard, O. and Katz, L. F. (1992) Regional Evolutions, *Brookings Papers on Economic Activity*, No. 1, pp. 1-76.
- Bruno, G., Marelli, E and Signorelli, M. (2014) The rise of NEET and youth unemployment in EU regions after the crisis, *Comparative Economic Studies*, 56, 592-615.
- Canziani, Patrizia and Petrongolo, Barbara. (2001). “Firing costs and stigma: A theoretical analysis and evidence from microdata” *European Economic Review*, 45(10): 1877-1906.
- Charron, N., Dijkstra, L. and Lapuente, V. (2012) Regional governance matters: Quality of government with European Union member states, *Regional Studies*, 48, 68-90.
- De Fraja, G., Klemos, S. and Rokey, J. (2017) The wounds that do not heal. The life-time scar of youth unemployment, Discussion Paper 11852 Centre for Economic Policy Research, LSE, London.
- Demidova, O., Marelli, E. and Signorelli, M. (2015) Youth labour market performances in the Russian and Italian regions, *Economic Systems*, 39, pp43-54.
- Fujita, M. and Krugman, P. (2004) The new economic geography: Past, present and the future, *Papers in Regional Science*, 83, 139-164.
- Green, A. E. and Livanos, I. (2013) Involuntary Non-Standard Employment and the Economic Crisis: Regional Insights from the UK, *Regional Studies*, 49(7), pp1-13.
- Gregg, P. (2001) The impact of youth unemployment on adult unemployment in the NCDS, *Economic Journal*, 111, 626-653.
- Gregg, P. and Tominey, E. (2005) The wage scar from male youth unemployment, *Labour*

Economics, 12, pp487-509.

Iacovou, Maria (2001). “Leaving home in the European Union”, Working Paper ISER 2001-18.

Iammarino, S., Rodriguez-Pose, A., and Storper, M. (2018) Regional inequality in Europe: evidence, theory, and policy implications, *Papers in Evolutionary Economic Geography*, 18.17, Utecht University.

Jimeno, J.F., and Rodriguez-Palenzuela, D. (2002) Youth unemployment in the OECD: Demographic shifts, labour market institutions, and macroeconomic shocks, ECB Working Paper.

Kahn, L.M. (2007) The impact of employment protection mandates on demographic temporary employment patterns: International microeconomic evidence, *Economic Journal*, 117(521): 333-356.

Kawaguchi, D. and Murao, T. (2012) Who bears the cost of the business cycle? Labour market institutions and the volatility of the youth unemployment rate, *IZA Journal of Labor Policy*, 1, pp1-22.

Kelly, E. and McGuinness, S. (2015) Impact of the Great Recession on unemployed and NEET individuals’ labour market transitions in Ireland, *Economic Systems*, 39, pp59-71.

Korenman, S. and Neumark, D. (2000) Cohort crowding and youth labour markets: A cross-national analysis, pp. 57-105 in Blanchflower, D. and Freeman, R. (Eds) *Youth, Employment and Joblessness in Advanced Countries*, Chicago, University of Chicago Press, 2000.

Lopez-Bazo, E., del Barrio, T. and Artis, M. (2002) The regional distribution of Spanish unemployment: A spatial analysis, *Papers in Regional Science*, 81, 365-389.

Maguire, S. (2015) NEET, unemployed, inactive or unknown – why does it matter?, *Education Research*, 57, 2, pp121-132.

Marston, (1985) Two views of the geographical distribution of unemployment, *Quarterly Journal of Economics*, 100, 57-79.

Martin, R. (1997) Regional Unemployment Disparities and their Dynamics, *Regional Studies*, 31:3, 237-252.

Modesto, Leonor. (2008). “Unions, Firing Costs, and Unemployment” *LABOUR*, 22(3): 509-546.

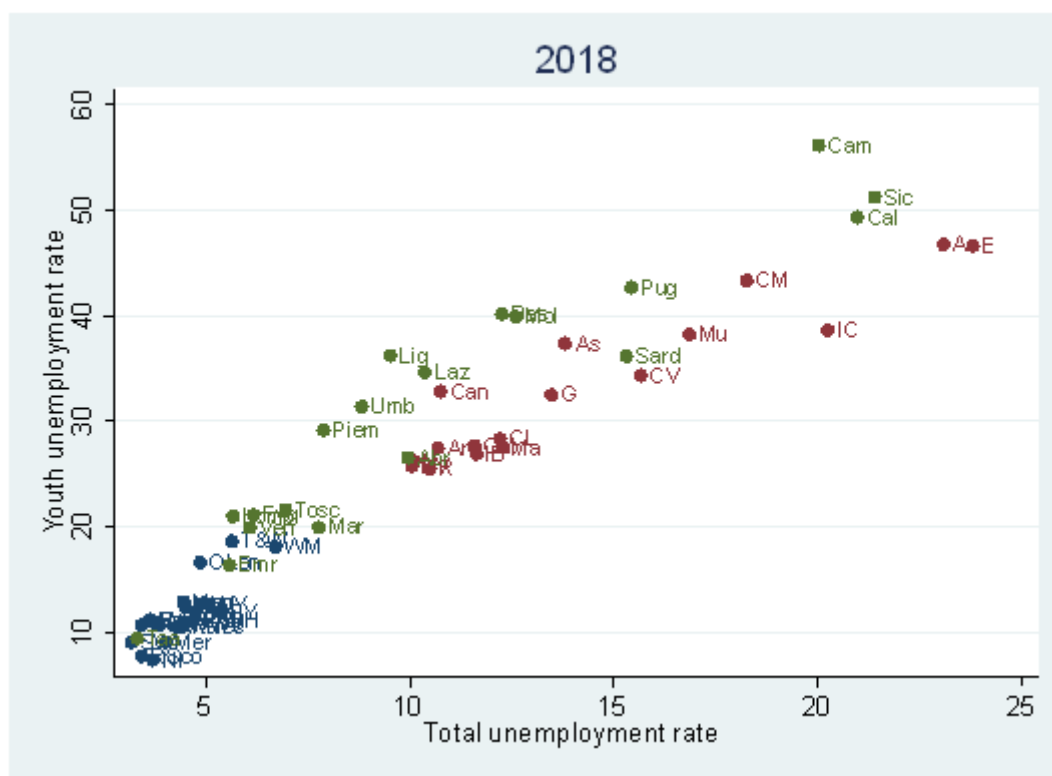
Molho, J. (1995) Spatial autocorrelation in British unemployment, *Journal of Regional Science*, 35, 641-658.

Moller, J. (2017) Youth unemployment in Europe from a regional perspective’, *CESifo Forum* 2, 18, June.

OECD (2009) *Jobs for Youths: Australia*, OECD Publishing, Paris.

- Perugini, C. and Signorelli, M. (2010) Youth labour market performance in European regions, *Economic Change Restructuring*, 43, pp151-185.
- Quintini, G. and Manfredi, T. (2009) Going separate ways? School-to-work transitions in the United States and Europe, OECD Social, Employment and Migration Working Paper, No. 90, OECD Publishing, Paris.
- Scarpetta, S., Sonnet, A. and Manfredi, T. (2010) Rising youth unemployment during the crisis: How to prevent negative long-term consequences on a generation, OECD Social, Employment and Migration Working Papers, No. 106, OECD Publishing, Paris.
- Shimer, R. (2001) The impact of young workers on the aggregate labour market, *The Quarterly Journal of Economics*, 116, pp. 969-1007.
- Taylor, J. and Bradley, S. (1996) Unemployment in Europe: Analysis of regional disparities in Germany, Italy and the UK, *Kyklos*, 50, pp221-245.
- Zeilstra, A. S. and Elhorst, J. P. (2014) Integrated analysis of regional and national unemployment differentials in the European Union, *Regional Studies*, 48, pp1739-1755.

Figure 1 The correlation between adult and youth unemployment rates by region, 2018



Note: The names associated with the acronyms for regions are provided in Table A4.

Figure 2 The relationship between changes in youth unemployment and NEET rates, 1993-2007 versus 2009-13 and 2009-13 versus 2014-18, Italy

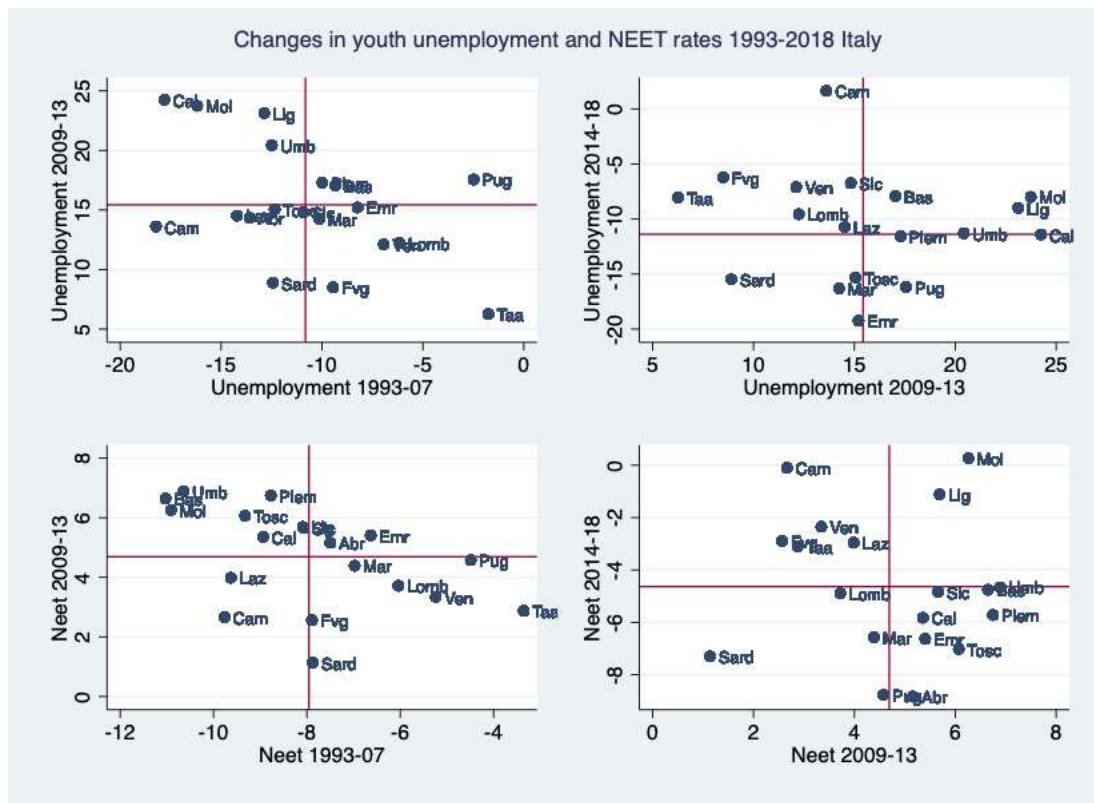


Figure 3 The relationship between changes in youth unemployment and NEET rates, 1993-2007 versus 2009-13 and 2009-13 versus 2014-18, Spain

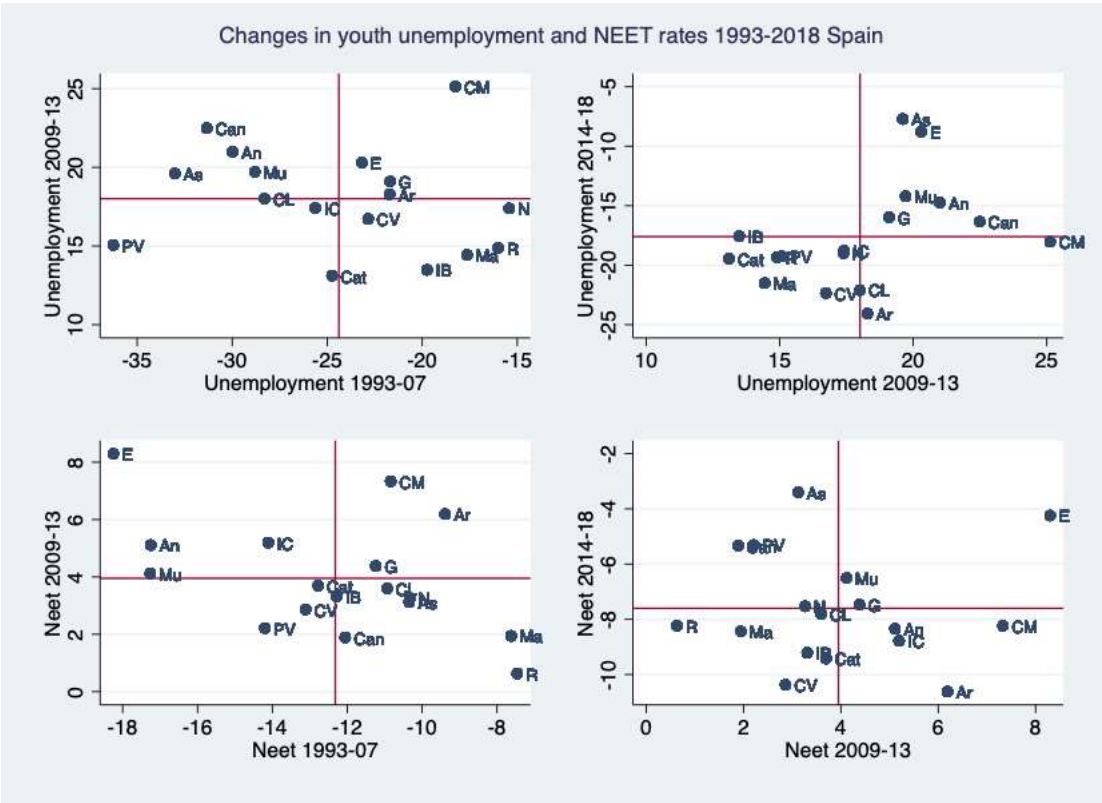


Figure 4 The relationship between changes in youth unemployment and NEET rates, 1993-2007 versus 2009-13 and 2009-13 versus 2014-18, UK

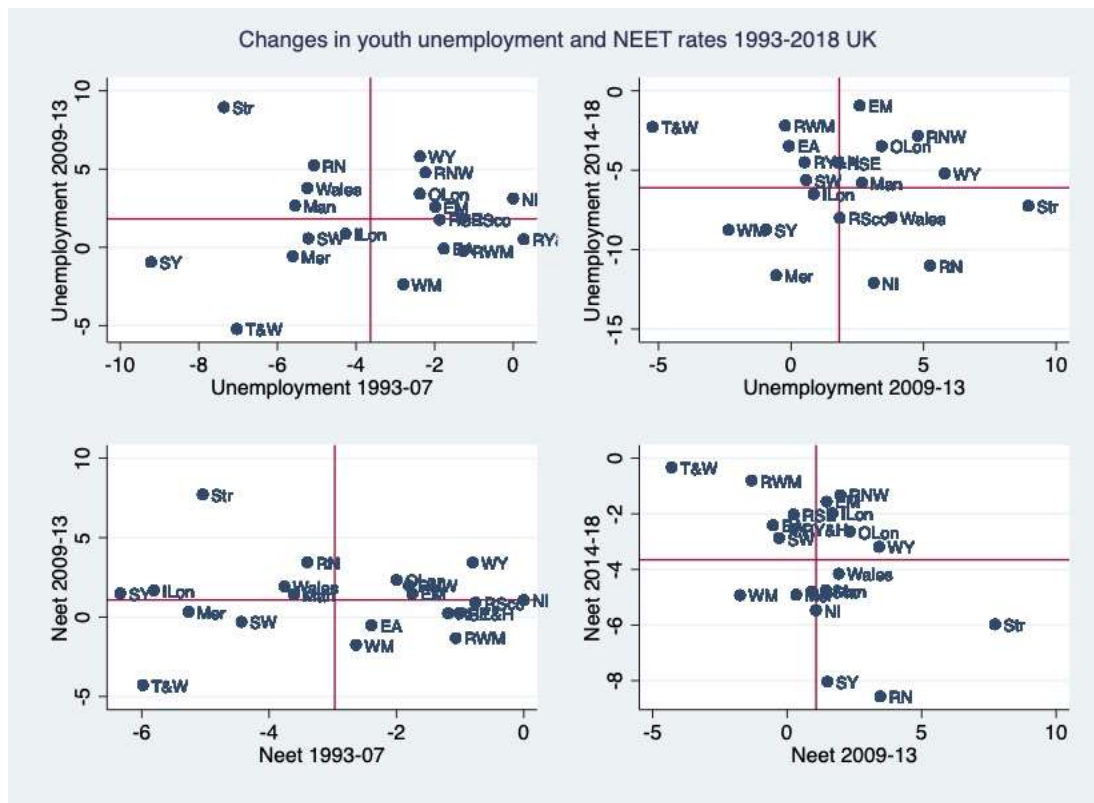


Table 1 Descriptive statistics for the five worse and five best performing regions by country

Panel A: Italy

Region	UR16 -24 (2018)	NEET rate 1624 (2018)	UR16 -24 (1993)	NEET rate 16-24 (1993)	% youths with HEQ	Change in % youths with HEQ	% young	Change in % young	manufc onst	Change in manufconst	No. SME	Change in No. SME
1 Trentino Emilia	9.43	5.85	6.77	7.09	4.28	3.91	7.97	-10.36	14.49	2.31	41705 16368	5804
2 Romagna	16.37	7.66	17.73	11.99	6.48	6.01	4.90	-8.35	10.81	4.33	9 18146	16767
3 Venezia	19.91	9.13	14.13	9.97	5.01	4.53	5.76	-11.51	11.26	4.56	2	25380
4 Marche	19.94	7.98	19.48	12.26	6.22	5.49	5.11	-7.90	10.75	5.08	57675 40502	7385
5 Lombardia	20.96	9.05	17.27	12.22	5.95	5.25	5.52	-9.99	10.29	4.78	2	105320
Mean	31.72	13.70	30.55	19.12	4.80	4.29	5.71	-8.55	10.92	4.42	99191	20525
Median	31.38	12.21	30.04	17.22	4.95	4.53	5.31	-8.35	10.75	4.73	57675	12066
1 Basilicata	40.13	16.17	40.82	27.45	4.95	4.60	5.31	-7.67	9.75	1.95	13154	4126
2 Puglia	42.64	18.39	34.78	23.92	4.80	4.31	6.89	-10.26	9.85	4.69	97427	32911
3 Calabria	49.32	24.19	50.01	28.95	2.59	2.01	7.41	-6.44	10.29	3.63	38212 10275	14752
4 Sicilia	51.21	25.86	47.78	30.94	2.61	2.05	6.63	-9.19	8.09	2.22	0 12433	31280
5 Campania	56.13	24.10	51.95	33.14	2.99	2.46	7.41	-8.25	8.86	3.21	1	44795

Panel B: Spain

Region	UR16 -24 (2018)	NEET rate 1624 (2018)	UR16 -24 (1993)	NEET rate 16-24 (1993)	% youths with HEQ	Change in % youths with HEQ	% young	ch9318e_pyo ung	manufc onst	Change in manufconst	No. SME	Change in No. SME
1 La Rioja	25.49	9.79	32.18	16.94	9.02	-5.43	5.74	-9.25	23.10	11.48	10742	3899
2 Pais Vasco	25.75	8.32	53.38	22.31	18.89	1.88	5.40	-9.04	22.11	8.74	72640	3375
3 Navarra	26.19	9.22	27.39	16.80	17.09	-0.75	6.69	-7.99	21.81	8.74	19281	6403
4 Islas Baleares	26.88	13.31	34.88	23.04	10.23	2.13	7.64	-9.96	37.78	17.02	42648	16496
5 Aragon	27.47	9.74	35.31	17.18	13.90	-0.06	6.15	-10.11	22.71	9.24	41890	11795
Mean	35.00	12.72	42.23	22.70	13.03	1.72	6.40	-10.80	23.90	10.03	81432	28154
Median	32.82	12.69	45.19	22.31	12.91	1.99	6.70	-10.11	22.68	9.38	58976	16496

1	Murcia	38.19	14.17	45.29	27.94	10.01	0.61	8.02	-14.76	22.68	9.38	43272	19237
2	Isla Canarias	38.61	15.67	48.01	26.97	13.42	6.02	6.76	-12.35	31.63	15.27	62885	25389
3	Castilla La Muncha	43.32	16.12	33.96	20.38	11.57	0.17	7.30	-13.32	21.45	8.37	58976	8825
4	Extremadura	46.62	16.69	49.35	30.73	12.66	4.50	6.70	-12.74	19.33	6.86	30208	11921
5	Andalucia	46.72	16.88	53.27	31.28	10.63	1.78	7.05	-14.43	22.00	10.34	23261	105498
												6	

Panel C: UK

	Region	UR16 -24 (2018)	NEET rate 16-24 (2018)	UR16 -24 (1993)	NEET rate 16-24 (1993)	% youths with HEQ	Change in % youths with HEQ	% youn g	ch9318e_pyo ung	manufc onst	Change in manufconstr	No. SME	Change in No. SME
1	Rest of Scotland	7.73	9.01	14.25	13.74	13.82	8.28	13.35	-4.89	33.03	-26.14	99357	6412
2	Merseyside	9.01	11.13	25.75	22.21	12.95	9.39	14.01	-3.64	31.05	-30.87	15586	135772
3	South West	9.06	10.42	15.95	15.32	11.07	7.77	14.13	-2.57	32.64	-28.10	2	14053
4	Rest of North West	10.49	10.79	15.04	14.04	14.24	10.17	12.97	-4.46	32.13	-25.58	15586	44627
5	Wales	10.55	10.60	19.98	18.27	14.36	10.78	15.11	-2.88	34.97	-24.78	2	7458
	Mean	12.00	11.42	18.90	17.21	14.21	9.43	13.61	-4.01	32.65	-24.88	58458	23924
	Median	11.35	11.21	19.06	17.03	13.79	9.34	13.88	-3.94	32.65	-25.23	13011	14209
1	West Yorkshire	12.71	11.48	17.19	15.86	14.44	8.76	14.72	-3.66	33.03	-19.96	3	14081
2	Greater Manchester	12.88	11.87	21.36	18.86	14.70	10.56	13.84	-4.49	33.92	-22.04	6	44627
3	Outer London	16.61	13.57	19.22	16.85	19.33	11.65	10.56	-6.14	32.62	-23.66	15586	33516
4	West Midlands	18.08	13.69	23.61	20.80	13.67	8.24	14.62	-3.68	30.82	-21.49	2	14338
5	Tyne & Wear	18.61	15.40	21.86	19.32	13.37	9.31	14.90	-3.45	31.74	-28.86	25332	7371

Table 2 The determinants of quarterly variations in regional unemployment rates (16-19 year olds), 1993-2018

VARIABLES	UK			Spain			Italy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
URNational adult	1.300*** (0.282)	1.223*** (0.153)	2.210*** (0.292)	2.057*** (0.190)	2.076*** (0.200)	2.179*** (0.175)	-1.162*** (0.239)	-0.686*** (0.204)	-0.548** (0.202)
% youths with HEQ workforce	0.115 (0.109)	-0.130 (0.088)	-0.214** (0.086)	-0.507** (0.207)	0.100 (0.154)	0.086 (0.142)	-0.339*** (0.112)	-0.273* (0.130)	-0.456*** (0.119)
% young	1.486*** (0.254)	0.874*** (0.126)	0.682*** (0.174)	-0.783 (0.529)	0.567 (0.488)	1.771** (0.728)	-0.281 (0.375)	0.543** (0.223)	0.623** (0.235)
% Marriedfemale25	-0.514*** (0.097)	- (0.037)	-0.039 (0.032)	-0.335 (0.299)	0.189* (0.102)	0.558* (0.292)	-0.702*** (0.173)	-0.568*** (0.119)	0.025 (0.119)
% Immigr	0.364** (0.173)	0.411** (0.192)	-0.224 (0.315)	0.184 (0.194)	0.890*** (0.189)	0.861*** (0.207)			
% Manufconstr	-0.147*** (0.032)	- (0.017)	-0.079** (0.034)	-0.409* (0.197)	-0.739*** (0.159)	-0.692*** (0.160)	-0.607** (0.223)	-0.193* (0.098)	-0.137 (0.112)
Log (SME)	-5.409*** (1.133)	-3.067 (2.638)	-5.023 (5.190)	-2.694 (2.095)	8.007 (9.075)	5.435 (7.998)			
% Temp	0.019 (0.243)	-0.439 (0.369)	-0.210 (0.347)	0.116 (0.219)	-0.457** (0.172)	-0.429** (0.149)	0.243** (0.096)	0.044 (0.084)	-0.111 (0.076)
% PartTime	0.229 (0.238)	0.838*** (0.206)	0.702*** (0.209)	1.056* (0.516)	0.926** (0.353)	0.803** (0.303)	-0.428** (0.166)	-0.072 (0.130)	0.343** (0.124)
Firstq	-0.395 (0.260)	- (0.293)	-1.010*** (0.313)	-0.242 (0.718)	-0.273 (0.477)	0.006 (0.475)	-1.526*** (0.352)	-1.637*** (0.341)	-1.820*** (0.326)
Secondq	0.019 (0.274)	-0.806** (0.366)	-0.933** (0.350)	0.775 (0.716)	1.719*** (0.554)	1.894*** (0.547)	-2.673*** (0.255)	-2.644*** (0.217)	-2.560*** (0.221)
Thirdq	1.245*** (0.328)	1.614*** (0.314)	1.588*** (0.324)	-0.627 (0.576)	-0.484 (0.583)	-1.051 (0.616)	-1.610*** (0.304)	-1.412*** (0.296)	-1.168*** (0.262)
Regional real GDP lagged	0.054** (0.023)	0.046 (0.030)	0.084 (0.055)	0.060* (0.031)	-0.067 (0.045)	-0.206 (0.149)	0.009** (0.004)	0.127*** (0.033)	-0.062 (0.052)
Constant	58.486*** (14.431)	23.132 (30.582)	25.407 (57.700)	61.438** (22.693)	-68.397 (103.813)	-86.258 (84.010)	57.158*** (9.769)	26.813*** (5.582)	18.927*** (6.031)
Observations	2,072	2,072	2,072	1,872	1,872	1,872	1,957	1,957	1,957
R-squared	0.568	0.660	0.691	0.669	0.758	0.784	0.143	0.243	0.316

Note: Model 1 excludes regional fixed effects; Model 2 includes regional fixed effects and Model 3 includes regional fixed effects interacted with a period trend.

Table 3 The determinants of quarterly regional unemployment rates (16-24 year olds), 1993-2011

VARIABLES	UK			Spain			Italy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
URNational adult	1.396*** (0.164)	1.431*** (0.117)	2.183*** (0.149)	1.693*** (0.131)	1.602*** (0.106)	1.705*** (0.077)	1.099 (0.748)	2.723*** (0.425)	2.687*** (0.402)
% youths with HEQ workforce	-0.091 (0.082)	-0.193*** (0.056)	-0.207*** (0.040)	-0.510*** (0.152)	-0.044 (0.107)	-0.062 (0.071)	-0.872** (0.304)	0.232 (0.136)	0.018 (0.136)
% young	0.884*** (0.184)	0.370*** (0.098)	0.159 (0.106)	-0.824 (0.535)	0.393 (0.493)	2.031** (0.726)	-0.963 (0.904)	0.446 (0.466)	0.703 (0.410)
% Marriedfemale25	-0.305*** (0.067)	-0.075** (0.031)	-0.014 (0.028)	-0.519* (0.285)	0.037 (0.131)	0.185 (0.210)	-1.658** (0.717)	-0.600** (0.218)	-0.163 (0.212)
% Immigr	0.173 (0.136)	0.245* (0.123)	-0.197 (0.144)	-0.104 (0.157)	0.695*** (0.137)	0.534*** (0.112)			
% Manufconstr	-0.093*** (0.020)	-0.086*** (0.012)	-0.025 (0.015)	-0.517*** (0.173)	-0.679*** (0.154)	-0.434*** (0.144)	-2.091*** (0.488)	-0.502*** (0.141)	- (0.105)
Log (SME)	-4.133*** (0.639)	-2.761** (1.262)	-2.856 (2.484)	-1.704 (1.710)	-5.150 (6.050)	-10.467** (4.181)			
% Temp	0.104 (0.197)	-0.054 (0.170)	0.155 (0.125)	0.213 (0.221)	-0.431*** (0.145)	-0.482*** (0.102)	2.005*** (0.296)	-0.328* (0.162)	- (0.119)
% PartTime	0.143 (0.134)	0.695*** (0.126)	0.592*** (0.116)	0.630 (0.479)	0.650* (0.328)	0.645*** (0.128)	-1.832*** (0.553)	-0.076 (0.250)	0.493* (0.251)
Firstq	-0.182 (0.234)	-0.438* (0.212)	-0.565** (0.237)	-0.037 (0.455)	-0.080 (0.276)	0.126 (0.228)	0.954 (0.696)	-1.233*** (0.399)	- (0.377)
Secondq	0.072 (0.187)	-0.399* (0.217)	-0.485** (0.215)	-0.098 (0.381)	0.608** (0.264)	0.648** (0.250)	-1.808** (0.692)	-1.856*** (0.390)	- (0.387)
Thirdq	0.845*** (0.142)	1.169*** (0.137)	1.175*** (0.120)	0.170 (0.299)	0.355* (0.203)	-0.460 (0.318)	-3.260*** (0.994)	-1.554*** (0.336)	- (0.309)
Regional real GDP lagged	0.035* (0.019)	0.018 (0.024)	0.075** (0.033)	0.038 (0.027)	-0.067** (0.027)	-0.126 (0.119)	-0.009 (0.017)	0.098 (0.076)	-0.039 (0.086)
Constant	46.193** * (7.934)	20.473 (16.960)	8.080 (29.943)	57.422** * (18.198)	79.046 (67.835)	83.316* (42.348)	99.694** * (33.932)	26.168 (16.988)	19.142 (16.766)
Observations	2,072	2,072	2,072	1,872	1,872	1,872	1,957	1,957	1,957
R-squared	0.552	0.683	0.727	0.762	0.884	0.914	0.579	0.873	0.898

Table 4 The determinants of spatial variations in regional NEET rates (16-19 year olds), 1993-2011

VARIABLES	UK			Spain			Italy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
URNational adult	0.360** (0.135)	0.194 (0.122)	0.737*** (0.193)	0.285*** (0.044)	0.304*** (0.054)	0.254*** (0.065)	-0.349 (0.202)	0.096 (0.087)	0.158** (0.073)
% youths with HEQ workforce	-0.086* (0.045)	-0.152** (0.054)	-0.143*** (0.042)	-0.218*** (0.029)	-0.101*** (0.035)	-0.111*** (0.031)	-0.230*** (0.051)	-0.013 (0.035)	-0.101*** (0.023)
% young	1.449*** (0.163)	1.063*** (0.097)	0.904*** (0.075)	0.987*** (0.116)	1.224*** (0.074)	1.003*** (0.166)	0.408 (0.253)	0.666*** (0.139)	0.547*** (0.092)
% Marriedfemale25	-0.218*** (0.058)	-0.040 (0.034)	0.008 (0.028)	-0.171** (0.072)	-0.205 (0.124)	-0.021 (0.133)	-0.359* (0.199)	-0.103* (0.053)	0.036 (0.063)
% Immigr	0.075 (0.075)	-0.008 (0.094)	-0.278* (0.136)	0.082 (0.066)	0.341*** (0.056)	0.341*** (0.054)			
% Manufconstr	-0.073*** (0.016)	-0.098*** (0.011)	-0.048** (0.021)	-0.080 (0.048)	-0.124 (0.076)	-0.331*** (0.082)	-0.511*** (0.137)	-0.156*** (0.045)	-0.082* (0.043)
Log (SME)	-1.657* (0.797)	-1.691* (0.843)	-2.309 (1.754)	-0.981*** (0.317)	-0.126 (1.886)	2.801 (1.926)			
% Temp	0.445** (0.174)	0.001 (0.165)	0.134 (0.184)	-0.063 (0.049)	-0.086 (0.050)	-0.057 (0.052)	0.491*** (0.080)	0.001 (0.051)	-0.059* (0.033)
% PartTime	0.307 (0.207)	0.399*** (0.116)	0.343** (0.131)	0.407*** (0.090)	0.336*** (0.065)	0.385*** (0.107)	-0.374** (0.130)	-0.033 (0.055)	0.206*** (0.038)
Firstq	-0.440*** (0.153)	-0.678*** (0.151)	-0.740*** (0.164)	-0.517** (0.228)	-0.423** (0.200)	-0.519** (0.215)	-0.230 (0.196)	-0.714*** (0.142)	-0.831*** (0.125)
Secondq	-0.444* (0.237)	-0.812*** (0.248)	-0.849*** (0.244)	-0.434* (0.211)	-0.222 (0.203)	-0.226 (0.187)	-1.245*** (0.142)	-1.237*** (0.117)	-1.279*** (0.133)
Thirdq	1.969*** (0.239)	2.224*** (0.193)	2.248*** (0.210)	2.812*** (0.353)	2.765*** (0.351)	2.961*** (0.359)	-0.134 (0.229)	0.270** (0.118)	0.332*** (0.104)
Regional real GDP lagged	0.040*** (0.012)	0.021 (0.021)	0.053** (0.023)	0.021** (0.009)	-0.019 (0.015)	0.009 (0.045)	0.005 (0.003)	0.050** (0.020)	-0.043** (0.020)
Constant	4.893 (14.823)	12.668 (9.881)	9.404 (18.998)	12.412** (4.919)	1.256 (21.094)	-26.130 (18.720)	21.321** (9.518)	2.772 (3.883)	5.597* (3.222)
Observations	2,072	2,072	2,072	1,872	1,872	1,872	1,957	1,957	1,957
R-squared	0.432	0.546	0.575	0.572	0.614	0.633	0.601	0.793	0.843

Table 5 The determinants of spatial variations in NEET rates (16-24 year olds), 1993-2011

VARIABLES	UK			Spain			Italy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
URNational adult	0.877*** (0.120)	0.833*** (0.108)	1.368*** (0.131)	0.662*** (0.062)	0.662*** (0.046)	0.629*** (0.055)	0.135 (0.379)	0.847*** (0.165)	0.838*** (0.142)
% youths with HEQ workforce	-0.091* (0.053)	-0.142*** (0.043)	-0.136*** (0.030)	-0.281*** (0.066)	-0.087** (0.031)	-0.091*** (0.028)	-0.440*** (0.127)	0.070 (0.046)	-0.032 (0.044)
% young	0.918*** (0.136)	0.568*** (0.091)	0.411*** (0.066)	0.398** (0.187)	0.943*** (0.085)	1.090*** (0.139)	0.068 (0.428)	0.519** (0.229)	0.608*** (0.127)
% Marriedfemale25	-0.192*** (0.045)	-0.038 (0.027)	0.007 (0.022)	-0.258** (0.120)	-0.065 (0.125)	0.149* (0.076)	-0.594 (0.367)	-0.148 (0.100)	-0.041 (0.091)
% Immigr	0.097 (0.081)	0.108 (0.077)	-0.178* (0.097)	0.018 (0.098)	0.431*** (0.073)	0.327*** (0.064)			
% Manufconstr	-0.059*** (0.014)	-0.063*** (0.010)	-0.015 (0.013)	-0.156 (0.097)	-0.229** (0.089)	-0.351*** (0.054)	-1.079*** (0.241)	-0.365*** (0.064)	-0.227*** (0.045)
Log (SME)	-2.289*** (0.559)	-1.893*** (0.653)	-2.190 (1.361)	-1.662* (0.833)	-1.880 (2.327)	-0.283 (2.429)			
% Temp	0.226 (0.142)	0.009 (0.102)	0.125 (0.083)	0.053 (0.079)	-0.177*** (0.042)	-0.189*** (0.053)	1.069*** (0.144)	-0.097 (0.077)	-0.217*** (0.054)
% PartTime	0.168 (0.133)	0.398*** (0.080)	0.336*** (0.081)	0.329** (0.152)	0.258*** (0.069)	0.384*** (0.072)	-0.788*** (0.268)	-0.041 (0.106)	0.257*** (0.081)
Firstq	-0.329** (0.143)	-0.497*** (0.128)	-0.570*** (0.144)	-0.338 (0.256)	-0.332* (0.178)	-0.448** (0.162)	0.391 (0.331)	-0.722*** (0.155)	-0.826*** (0.112)
Secondq	-0.009 (0.162)	-0.306 (0.181)	-0.351* (0.179)	-0.706*** (0.204)	-0.392** (0.138)	-0.429*** (0.125)	-1.005*** (0.283)	-1.029*** (0.163)	-1.067*** (0.178)
Thirdq	1.653*** (0.123)	1.881*** (0.097)	1.902*** (0.099)	2.173*** (0.272)	2.183*** (0.255)	2.218*** (0.243)	-0.610 (0.432)	0.210 (0.124)	0.234* (0.127)
Regional real GDP lagged	0.030** (0.012)	0.013 (0.019)	0.045** (0.020)	0.034** (0.014)	-0.017 (0.014)	0.039 (0.039)	-0.001 (0.007)	0.054 (0.034)	-0.054* (0.029)
Constant	20.732** (8.978)	15.409* (8.617)	9.138 (15.990)	28.187** (10.597)	23.779 (25.962)	-1.119 (25.651)	39.234** (17.477)	10.147 (7.384)	12.585** (5.422)
Observations	2,072	2,072	2,072	1,872	1,872	1,872	1,957	1,957	1,957
R-squared	0.527	0.643	0.686	0.697	0.806	0.822	0.636	0.903	0.933

Table 6 Spatial clustering and youth unemployment rates (16-19 year olds), AR IV models

	UK			Spain			Italy		
	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage
Wur 1619	0.490*** (0.024)		1.224*** (0.409)	0.538*** (0.026)		0.902*** (0.101)	0.521*** (0.032)		0.514** (0.204)
In Wyoung		3.129*** (0.989)			4.713*** (0.421)			3.144*** (0.454)	
N	1976	1976	1976	1560	1560	1560	1957	1957	1957
F test			10.016			125.184			47.985

Note: all specifications include controls and regional fixed effects. IV= neighbouring n. of young

Table 7 Spatial clustering and youth unemployment rates (16-24 year olds), AR IV models

	UK			Spain			Italy		
	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage
Wur 1624	0.585*** (0.024)		1.820*** (0.496)	0.403*** (0.02)		0.978*** (0.108)	0.769*** (0.02)		0.342* (0.182)
In Wyoung		1.960*** (0.596)			1.202*** (0.141)			3.537*** (0.659)	
N	1976	1976	1976	1872	1560	1560	1957	1957	1957
F test			10.805			72.537			28.836

Note: all specifications include controls and regional fixed effects. IV= neighbouring n. of young

Table 8 Spatial clustering and NEET rates (16-19 year olds), AR IV models

	UK			Spain			Italy		
	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage
Wneet									
1619	0.349*** (0.026)		1.130*** (0.387)	0.593*** (0.03)		1.538*** (0.263)	0.596*** (0.025)		0.380*** (0.079)
ln									
Wyoung		2.133*** (0.594)			0.982*** (0.17)			2.967*** (0.202)	
N	1976	1976	1976	1560	1560	1560	1957	1957	1957
Ftest			12.876			33.196			215.189

Note: all specifications include controls and regional fixed effects

Table 9 Spatial clustering and NEET rates (16-24 year olds), AR IV models

	UK			Spain			Italy		
	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage	OLS	1st stage	2nd stage
Wneet 1624	0.473*** (0.026)		2.352*** (0.625)	0.613*** (0.022)		0.587*** (0.127)	0.735*** (0.02)		0.326*** (0.086)
ln									
Wyoung		1.604*** 0.458			0.996*** 0.147			2.952*** 0.261	
N	1976	1976	1976	1560	1560	1560	1957	1957	1957
F test			12.281			46.039			127.855

Note: all specifications include controls and regional fixed effects. IV= neighbouring n. of young

Appendix A

Table A1 Coefficients of Variation over time for all age youth unemployment rates and NEET rates

year	Italy		Spain		UK	
	Unemployment	NEET	Unemployment	NEET	Unemployment	NEET
1993	43.25	39.39	19.33	22.59	21.97	18.47
1994	44.42	40.99	19.11	24.72	19.67	16.30
1995	49.57	44.53	22.06	27.76	24.77	18.60
1996	51.21	45.61	21.11	25.19	24.14	19.75
1997	52.03	46.13	24.27	26.02	25.46	22.48
1998	56.84	49.80	24.64	30.45	25.60	21.51
1999	61.93	53.38	35.23	38.33	22.54	20.44
2000	66.00	58.26	33.58	32.80	27.15	23.48
2001	68.73	61.10	32.57	28.89	23.51	20.28
2002	69.30	60.91	28.48	31.70	21.63	18.61
2003	67.58	60.01	21.03	28.66	23.31	18.93
2004	55.88	55.48	26.62	31.18	26.43	20.24
2005	55.60	54.71	33.76	35.44	23.30	18.94
2006	52.30	55.33	29.88	37.61	19.71	17.36
2007	54.07	58.90	30.03	31.78	21.06	16.14
2008	53.25	56.40	22.38	25.86	24.66	18.57
2009	42.01	47.04	14.31	18.47	19.00	15.10
2010	37.46	42.16	18.30	26.00	14.76	9.89
2011	35.24	42.39	18.54	22.28	16.47	13.80
2012	31.35	35.24	15.14	22.62	14.70	12.86
2013	30.19	34.32	12.43	19.83	20.86	16.46
2014	28.08	34.81	12.20	18.42	19.45	14.08
2015	32.67	38.06	19.54	25.69	21.47	13.31
2016	34.70	38.98	21.38	24.02	18.48	12.54
2017	37.97	42.88	22.33	24.31	23.65	14.18
2018	40.46	44.36	29.17	30.03	25.42	13.69

Table A2. Descriptive statistics. Mean and Standard Deviation (in parentheses)

	UK	SPAIN	ITALY
UR 16-24	16.065 (5.025)	34.626 (13.936)	30.320 (15.821)
UR 16-19	22.875 (8.909)	46.459 (18.020)	16.782 (6.388)
NEETS RATE 16-24	14.487 (3.668)	16.161 (6.620)	15.406 (7.742)
NEETS RATE 16-19	16.229 (4.631)	11.119 (6.210)	8.041 (4.460)
URnational adult	4.908 (1.531)	15.170 (5.079)	7.244 (1.723)
% youths with HEQ workforce	12.103 (6.368)	19.782 (7.867)	2.658 (2.252)
% young	15.750 (1.728)	11.040 (3.942)	8.708 (3.041)
% Marriedfemale25	24.894 (3.806)	27.139 (2.454)	27.721 (3.670)
% Immigr	10.089 (9.771)	7.920 (6.822)	
% Manufconstr	48.940 (15.808)	21.500 (6.246)	10.468 (3.230)
Log (SME)	11.420 (0.541)	10.701 (1.092)	15.639 (0.933)
% Temp	6.509 (1.246)	29.663 (6.939)	12.526 (4.618)
% PartTime	27.164 (2.621)	10.687 (3.754)	12.101 (5.036)
Regional real GDP lagged vabctesl	87.149 (51.272)	50.623 (52.578)	81.002 (74.839)
Observations	2,072	1,872	1,957

Table A3 Definition of variables

	Definition
UR 16-24 (65 years old onwards are excluded)	Unemployed out of the unemployed, employed and on government training 16-24
UR 16-19	Unemployed out of the unemployed, employed and on government training 16-19
NEETS RATE 16-24	Inactive and unemployed out of the inactive, unemployed, employed, government training and in education 16-24
NEETS RATE 16-19	Inactive and unemployed out of the inactive, unemployed, employed, government training and in education 16-24
URNational adult	Unemployed out of the unemployed, employed and on government training for those 25 years old and older
% youths with HEQ workforce	Proportion of youth with higher education qualifications in the workforce
% young	Proportion of youth 16-24 out of the whole population
% Marriedfemale25	Proportion of married females under 25 years old
% Immigr	Proportion of immigrants out of the whole population
% Manufconstr	Proportion of workers in manufacture and construction industries
Log (SME)	The log of the number of small and medium enterprises (<50 workers)
% Temp	Rate of temporary employment out of all contracts (temporary and full time contracts)
% PartTime	Rate of part time employment out of full time and part time contracts
Regional real GDP lagged	Gross Value Added in million of Euros

Note: All variables are disaggregated at a regional and quarterly level and drawn from the country specific labour force surveys, except for the number of small and medium enterprises and the regional real GDP,

disaggregated at a regional and annual level. These were obtained from BIS (ONS) and DIRCE (INE) and the corresponding national institutes of statistics (ONS, INE and ISTAT), respectively.

Table A4 Description of acronyms

UK			Spain		Italy
T&W	Tyne & Wear	An	Andalucia	Piem	Piemonte
RN	Rest of Northern Region	Ar	Aragon	Vda	Valle d'Aosta
SY	South Yorkshire	As	Asturias	Lomb	Lombardia
WY	West Yorkshire	IB	Islas Baleares	Taa	Trentino-Alto Adige
RY&H	Rest of Yorks &	IC	Islas Canarias	Ven	Veneto
	Humberside				Friuli-Venezia
EM	East Midlands	Can	Cantabria	Fvg	Giulia
EA	East Anglia	CL	Castilla Leon	Lig	Liguria
Ilon	Inner London	CM	Castilla La Mancha	Emr	Emilia Romagna
Olon	Outer London	Cat	Cataluna	Tosc	Toscana
RSE	Rest of South East	CV	Comunidad	Umb	Umbria
			Valenciana		
SW	South West	E	Extremadura	Mar	Marche
WM	West Midlands	G	Galicia	Laz	Lazio
RWM	Rest of West Midlands	Ma	Madrid	Abr	Abruzzo
Man	Greater Manchester	Mu	Murcia	Mol	Molise
Mer	Merseyside	N	Navarra	Cam	Campania
RNW	Rest of North West	PV	Pais Vasco	Pug	Puglia
Wales	Wales	R	La Rioja	Bas	Basilicata
Str	Strathclyde	CeMe	Ceuta y Melilla	Cal	Calabria
RSCO	Rest of Scotland			Sic	Sicilia
NI	Northern Ireland			Sard	Sardegna